

MA3560 (4-0) Applied Modern Algebra and Number Theory

Syllabus

Coordinator: Craig Rasmussen

Prerequisite: MA3025, or equivalent familiarity with proof techniques.

Text: *Introduction to Abstract Algebra*, 6th edition, Neal H. McCoy and Gerald J. Janusz, Harcourt/Academic Press 2001, and supplemental notes on finite fields.

Hours	Topics	Sections
1-1	Formal Properties of the Integers, Rings Defined	1.1, 1.2
2-3	Examples of Rings, Properties of Addition and Multiplication	1.3, 1.4
1-4	Defining Properties of the Integers, Integers Modulo n	1.5
2-6	Homomorphisms and Isomorphisms	2.3
2-8	Ideals	2.4
1-9	Characterization of the Ring of Integers	2.5
1-10	First Isomorphism Theorem for Rings	2.6
1-11	Fields Defined	3.1
1-12	Properties of the Field of Rational Numbers	3.2
2-14	The Field of Real Numbers	3.3, 3.4
1-15	The Complex Field	3.5
1-16	Division in \mathbb{Z}	4.1, 4.2
2-18	Fundamental Theorem of Arithmetic	4.3, 4.4
2-20	Polynomial Rings	5.1
2-22	Divisors in $F[x]$	5.2
2-24	Unique Factorization in $F[x]$	5.3
2-26	Roots of Polynomials	5.4
2-28	Factor Rings of $F[x]$	5.5
2-30	Splitting Fields	5.6
2-32	More on Finite Fields	Notes
1-33	Groups Defined	6.1
1-34	Mappings, Permutation Groups	6.2
1-35	Group Homomorphisms, Isomorphisms	6.3
1-36	Cyclic Groups	6.4
1-37	Cosets, Lagrange's Theorem	6.5
2-39	Normal Subgroups, Factor Groups	6.6
1-40	The Symmetric Group	6.7
4-44	Exams and Holidays	